

FACT SHEET

as required by LAC 33:IX.2411, for draft **Louisiana Pollutant Discharge Elimination System Permit No. LA0095222; AI 38060; PER20060001** to discharge to waters of the State of Louisiana as per LAC 33:IX.2311.

The permitting authority for the Louisiana Pollutant Discharge Elimination System (LPDES) is:

Louisiana Department of Environmental Quality
Office of Environmental Services
P. O. Box 4313
Baton Rouge, Louisiana 70821-4313

- I. **THE APPLICANT IS:** City of Natchitoches
Wastewater Treatment Plant
Post Office Box 37
Natchitoches, LA 71458
- II. **PREPARED BY:** Todd Franklin
- DATE PREPARED:** April 21, 2006
- III. **PERMIT ACTION:** reissue LPDES permit LA0095222, AI 38060; PER20060001

LPDES application received: February 20, 2006

EPA has not retained enforcement authority.

Previous LPDES permit issued: June 1, 2001

Previous LPDES permit expired: May 31, 2006

IV. **FACILITY INFORMATION:**

A. The application is for the discharge of treated sanitary wastewater from a publicly owned treatment works serving the City of Natchitoches.

B. The permit application does indicate the receipt of industrial wastewater. The industrial dischargers include:

<u>Name of Discharger</u>	<u>Flow</u>
Alliance Compressors	0.075014 MGD
Pilgrim's Pride	0.022 MGD

C. The facility is located at 900 Laird Fletcher Road in Natchitoches, Natchitoches Parish.

D. The treatment facility consists of screening followed by grit removal, followed by treatment in an oxidation ditch with intra channel clarifier. Disinfection is by ultraviolet light.

E. Outfall 001

Discharge Location: Latitude 31° 41' 19" North
 Longitude 93° 0' 12" West

Description: treated sanitary wastewater

Design Capacity: 4.9 MGD

Type of Flow Measurement which the facility is currently using:

Combination Totalizing Meter / Continuous Recorder

V. RECEIVING WATERS:

The discharge is into the Red River in segment 100101 of the Red River Basin. This segment is listed on the 303(d) list of impaired waterbodies.

The critical low flow (7Q10) of the Red River is 1,330.0 cfs.

The hardness value is 166.0 mg/l and the fifteenth percentile value for TSS is 34.0 mg/l. (see memo from George Chike to Todd Franklin dated March 8, 2006)

The designated uses and degree of support for Segment 100101 of the Red River Basin are as indicated in the table below^{1/}:

Overall Degree of Support for Segment	Degree of Support of Each Use						
	Primary Contact Recreation	Secondary Contact Recreation	Propagation of Fish & Wildlife	Outstanding Natural Resource Water	Drinking Water Supply	Shell fish Propagation	Agriculture
Partial	Full	Full	Not Supported	N/A	Not Supported	N/A	Full

^{1/} The designated uses and degree of support for Segment 100101 of the Red River Basin are as indicated in LAC 33:IX.1123.C.3, Table (3) and the 2004 Water Quality Management Plan, Water Quality Inventory Integrated Report, Appendix A, respectively.

VI. ENDANGERED SPECIES:

The receiving waterbody, Subsegment 100101 of the Red River Basin, is not listed in Section II.2 of the Implementation Strategy as requiring consultation with the U. S. Fish and Wildlife Service (FWS). This strategy was submitted with a letter dated October 21, 2005, from Watson (FWS) to Gautreaux (LDEQ). Therefore, in accordance with the Memorandum of Understanding between the LDEQ and the FWS, no further informal (Section 7, Endangered Species Act) consultation is required. It was determined that the issuance of the LPDES permit is not likely to have an adverse effect on any endangered or candidate species or the critical habitat. The effluent limitations established in the permit ensure protection of aquatic life and maintenance of the receiving water as aquatic habitat.

VII. HISTORIC SITES:

The discharge is from an existing facility location, which does not include an expansion beyond the existing perimeter. Therefore, there should be no potential effect to sites or properties on or eligible for listing on the National Register of Historic Places, and in accordance with the 'Memorandum of Understanding for the Protection of Historic Properties in Louisiana Regarding LPDES Permits' no consultation with the Louisiana State Historic Preservation Officer is required.

VIII. PUBLIC NOTICE:

Upon publication of the public notice, a public comment period shall begin on the date of publication and last for at least 30 days thereafter. During this period, any interested persons may submit written comments on the draft permit modification and may request a public hearing to clarify issues involved in the permit decision at this Office's address on the first page of the statement of basis. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing.

Public notice published in:

Local newspaper of general circulation

Office of Environmental Services Public Notice Mailing List

For additional information, contact:

Mr. Todd Franklin
Permits Division
Department of Environmental Quality
Office of Environmental Services
P. O. Box 4313
Baton Rouge, Louisiana 70821-4313

IX. PROPOSED PERMIT LIMITS:

Subsegment 100101, Red River-Arkansas State Line to Alexandria, is listed on LDEQ's Final 2004 303(d) List as impaired for sulfates and color. To date no TMDLs have been completed for this waterbody. A reopener clause will be established in the permit to allow for the requirement of more stringent effluent limitations and requirements as imposed by a TMDL. Until completion of TMDLs for the Red River Basin, those suspected causes for impairment which are not directly attributed to the sanitary wastewater point source category have been eliminated in the formulation of effluent limitations and other requirements of this permit. Additionally, suspected causes of impairment which could be attributed to pollutants which were not determined to be discharged at a level which would cause, have the reasonable potential to cause or contribute to an excursion above any present state water quality standard were also eliminated.

Sulfates and Color

According to the 2004 305(b) Report, the sulfates impairment is attributed to sources outside state jurisdiction or borders and natural sources and the color impairment is attributed to upstream sources. Because the discharge consists of treated sanitary wastewater, which is not listed as a cause for the sulfates or color impairment, no requirements for these parameters shall be placed into the permit.

Final Effluent Limits:**OUTFALL 001**

Final limits shall become effective on the effective date of the permit and expire on the expiration date of the permit.

Effluent Characteristic	Monthly Avg. (lbs./day)	Monthly Avg.	Weekly Avg.	Basis
BOD ₅	1,226	30 mg/l	45 mg/l	Limits are set in accordance with the Statewide Sanitary Effluent Limitations Policy (SSELP) for facilities of this treatment type and size which discharge into the Red River.
TSS	1,226	30 mg/l	45 mg/l	Limits are set in accordance with the Statewide Sanitary Effluent Limitations Policy (SSELP) for facilities of this treatment type and size which discharge into the Red River.

Other Effluent Limitations:**1) Fecal Coliform**

The discharge from this facility is into a water body which has a designated use of Primary Contact Recreation. According to LAC 33:IX.1113.C.5.b.i, the fecal coliform standards for this water body are 200/100 ml and 400/100 ml. Therefore, the limits of 200/100 ml (Monthly Average) and 400/100 ml (Weekly Average) are proposed as Fecal Coliform limits in the permit. These limits are being proposed through Best Professional Judgement in order to ensure that the water body standards are not exceeded, and due to the fact that existing facilities have demonstrated an ability to comply with these limitations using present available technology.

2) pH

According to LAC 33:IX.3705.A.1., POTW's must treat to at least secondary levels. Therefore, in accordance with LAC 33:IX.5905.C, the pH shall not be less than 6.0 standard units nor greater than 9.0 standard units at any time.

3) Solids and Foam

There shall be no discharge of floating solids or visible foam in other than trace amounts in accordance with LAC 33:IX.1113.B.7.

Toxicity Characteristics

In accordance with EPA's Region 6 Post-Third Round Toxics Strategy, permits issued to treatment works treating domestic wastewater with a flow (design or expected) greater than or equal to 1 MGD shall require biomonitoring at some frequency for the life of the permit or where available data show reasonable potential to cause lethality, the permit shall require a whole effluent toxicity (WET) limit (*Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards*, September 27, 2001 VERSION 4).

Whole effluent biomonitoring is the most direct measure of potential toxicity which incorporates the effects of synergism of the effluent components and receiving stream water quality characteristics. Biomonitoring of the effluent is, therefore, required as a condition of this permit to assess potential toxicity. LAC 33:IX.1121.B.3. provides for the use of biomonitoring to monitor the effluent for protection of State waters. The biomonitoring procedures stipulated as a condition of this permit are as follows:

The permittee shall submit the results of any biomonitoring testings performed in accordance with the LPDES Permit No. LA0095222, **Biomonitoring Section** for the organisms indicated below.

TOXICITY TESTS

FREQUENCY

48 Hour Definitive Toxicity Test
using Daphnia pulex

1/quarter*

48 Hour Definitive Toxicity Test
using fathead minnow (Pimephales promelas)

1/quarter*

Dilution Series - The permit requires five (5) dilutions in addition to the control (0% effluent) to be used in the toxicity tests. These additional concentrations shall be 7%, 9%, 13%, 17%, and 22%. The low-flow effluent concentration (critical low-flow dilution) is defined as 17% effluent. The critical dilution is calculated in Appendix B-1 of this fact sheet. According to the Implementation of State Standards, acute toxicity testing in addition to, or in lieu of, chronic toxicity testing may be imposed for discharges that have a critical dilution of five percent (5%) or less. An acute to chronic ratio has been applied in the calculations. Results of all dilutions shall be documented in a full report according to the test method publication mentioned in the **Biomonitoring Section** under Whole Effluent Toxicity. This full report shall be submitted to the Office of Environmental Compliance as contained in the Reporting Paragraph located in the **Biomonitoring Section** of the permit.

The permit may be reopened to require effluent limits, additional testing, and/or other appropriate actions to address toxicity if biomonitoring data show actual or potential ambient toxicity to be the result of the permittee's discharge to the receiving stream or water body. Modification or revocation of the permit is subject to the provisions of LAC 33:IX.2383. Accelerated or intensified toxicity testing may be required in accordance with Section 308 of the Clean Water Act.

*If there are no lethal effects demonstrated after the first year of quarterly testing, the permittee may certify fulfillment of the WET testing requirements in writing to the permitting authority. If granted, the monitoring frequency for the test species may be reduced to not less than once per year for the less sensitive species (usually *Pimephales promelas*) and not less than twice per year for the more sensitive species (usually *Daphnia pulex*). Upon expiration of the permit, the monitoring frequency for both species shall revert to once per quarter until the permit is reissued.

X. PREVIOUS PERMITS:

LPDES Permit No. LA0095222: Issued: June 1, 2001

Expired: May 31, 2006

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>		<u>Monitoring Requirements</u>	
	<u>Daily Avg.</u>	<u>Daily Max.</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow	Report	Report	Continuous	Recorder
BOD ₅	30 mg/l	45 mg/l	2/week	6 Hour Composite
TSS	30 mg/l	45 mg/l	2/week	6 Hour Composite
Fecal Coliform				
Colonies/100 ml	200	400	2/week	Grab
pH	Range (6.0 su – 9.0 su)		2/week	Grab
Biomonitoring				
<i>Pimephales promelas</i>	Report	Report	1/quarter	24-hour comp.
<i>Daphnia pulex</i>	Report	Report	1/quarter	24-hour comp.

The permit contains biomonitoring.

The permit contains pollution prevention language.

XI. ENFORCEMENT AND SURVEILLANCE ACTIONS:**A) Inspections**

A review of the files indicates the following inspections were performed during the period beginning March 2004 and ending March 2006 for this facility.

Date – September 8, 2004

Inspector - LDEQ

Findings and/or Violations -

1. The flow meter was being replaced at the time of the inspection.
2. There have been no permit excursions since the last permit inspection which was conducted in September 2003.
3. The plant appeared to be well operated and maintained. All pieces of equipment were operable.
4. No areas of concern were noted.

Date – July 19, 2005

Inspector – LDEQ

Findings and/or Violations --

1. All factors were considered to be satisfactory at the time of the inspection.
2. Flow meter was reading 2.8% of actual flow.
3. No permit excursions since the last inspection in September 2004.
4. Plant appeared to be well operated and maintained.
5. No areas of concern were noted at the time of the inspection.

Date – September 22, 2005

Inspector – LDEQ

Findings and/or Violations –

1. A site inspection was conducted on September 22, 2005, in response to a release of raw sewage reported by the City of Natchitoches in Natchitoches Parish, Louisiana. The release occurred on September 18 when a 20-inch force main blew out at a location along the Hwy. 1 Bypass in Natchitoches.
2. The inspection was conducted with city representative, Dwane Steadman, Superintendent of Water / Sewer Maintenance. Mr. Steadman said that they shut down the pumps at a lift station to stop the flow of sewage then repaired the line with a clamp. It was estimated that 100,000 gallons of sewage escaped. The sewage drained into a parking lot and thence into a roadside ditch along the highway. It was also likely that some of the sewage drained across the highway into Bayou Jacko. Mr. Steadman said that they used bleach with hand sprayers to disinfect the parking lot and roadside ditch. He also said that they removed some contaminated soil from the site for disposal and replaced it with fresh soil. He also said that they flushed the drainage area with 2,000 gallons of fresh water.
3. The inspection revealed no problems. The force main was repaired and the site was cleaned up well. There appeared to be no significant impact to the receiving stream. The city's response to the incident was deemed satisfactory. The city submitted a written report of the incident as required.

B) Compliance and/or Administrative Orders

A review of the files indicates that no recent enforcement actions have been administered against this facility.

C) DMR Review

A review of the discharge monitoring reports for the period beginning January 2004 through December 2005 has revealed no violations.

XII.

ADDITIONAL INFORMATION:

Please be aware that the Department will be conducting a TMDL in the Red River Basin scheduled for completion in 2007. The Department of Environmental Quality reserves the right to impose more stringent discharge limitations and/or additional restrictions as a result of the TMDL. Therefore, prior to upgrading or expanding this facility, the permittee should contact the Department to determine the status of the work being done to establish future effluent limitations and additional permit conditions.

The nearest drinking water intake, Bossier City Waterworks is located upstream from the discharge point. Therefore, monitoring for Toxic Substances is not a requirement of this permit.

Final effluent loadings (i.e. lbs/day) have been established based upon the permit limit concentrations and the design capacity of 4.9 MGD.

Effluent loadings are calculated using the following example:

$$\text{BOD}_5: 8.34 \text{ gal/lb} \times 4.9 \text{ MGD} \times 30 \text{ mg/l} = 1,226 \text{ lb/day}$$

The Monitoring Requirements, Sample Types, and Frequency of Sampling are listed below. A DMR review for the monitoring period from January 2004 through December 2005 revealed no violations of the discharge permit. Therefore, the monitoring frequency for BOD₅, TSS, and Fecal Coliform has been reduced to 1/week.

<u>Effluent Characteristics</u>	<u>Monitoring Requirements</u>	
	<u>Measurement</u>	<u>Sample</u>
Flow	Continuous	Recorder
BOD ₅	1/week	6 Hr. Composite
Total Suspended Solids	1/week	6 Hr. Composite
Fecal Coliform Bacteria	1/week	Grab
Biomonitoring		
	<u>Daphnia pulex</u>	1/quarter ¹ 24 Hr. Composite
	<u>Pimephales promelas</u>	1/quarter ¹ 24 Hr. Composite
pH	2/week	Grab

¹ If there are no lethal effects demonstrated after the first year of quarterly testing, the permittee may certify fulfillment of the WET testing requirements in writing to the permitting authority. If granted, the monitoring frequency for the test species may be reduced to not less than once per year for the less sensitive species (usually *Pimephales promelas*) and not less than twice per year for the more sensitive species (usually *Daphnia pulex*). Upon expiration of the permit, the monitoring frequency for both species shall revert to once per quarter until the permit is reissued.

Pretreatment Requirements

Based upon consultation with LDEQ pretreatment personnel, general pretreatment language will be used due to the lack of either an approved or required pretreatment program.

Pollution Prevention Requirements

The permittee shall institute or continue programs directed towards pollution prevention. The permittee shall institute or continue programs to improve the operating efficiency and extend the useful life of the facility. The permittee will complete an annual Environmental Audit Report each year for the life of this permit according to the schedule below. The permittee will accomplish this requirement by completing an Environmental Audit Form which has been attached to the permit. All other requirements of the Municipal Wastewater Pollution Prevention Program are contained in Part II of the permit.

The audit evaluation period is as follows:

Audit Period Begins	Audit Period Ends	Audit Report Completion Date
Effective Date of Permit	12 Months from Audit Period Beginning Date	3 Months from Audit Period Ending Date

XIII**TENTATIVE DETERMINATION:**

On the basis of preliminary staff review, the Department of Environmental Quality has made a tentative determination to reissue a permit for the discharge described in this Statement of Basis.

XIV**REFERENCES:**

Louisiana Water Quality Management Plan / Continuing Planning Process, Vol. 8, "Wasteload Allocations / Total Maximum Daily Loads and Effluent Limitations Policy," Louisiana Department of Environmental Quality, 2005.

Louisiana Water Quality Management Plan / Continuing Planning Process, Vol. 5, "Water Quality Inventory Section 305(b) Report," Louisiana Department of Environmental Quality, 1998.

Louisiana Administrative Code, Title 33 - Environmental Quality, Part IX - Water Quality Regulations, Chapter 11 - "Louisiana Surface Water Quality Standards", Louisiana Department of Environmental Quality, 2004.

Louisiana Administrative Code, Title 33 - Environmental Quality, Part IX - Water Quality Regulations, Subpart 2 - "The LPDES Program", Louisiana Department of Environmental Quality, 2004.

Low-Flow Characteristics of Louisiana Streams, Water Resources Technical Report No. 22, United States Department of the Interior, Geological Survey, 1980.

Index to Surface Water Data in Louisiana, Water Resources Basic Records Report No. 17, United States Department of the Interior, Geological Survey, 1989.

LPDES Permit Application to Discharge Wastewater, City of Natchitoches, Wastewater Treatment Plant, February 20, 2006.

APPENDIX I

APPENDIX I

Numeric Toxic Limits: LDEQ has reviewed and evaluated the effluent analyses submitted by the permittee on February 20, 2006, and examined the following pollutants that are regulated by LAC 33:IX.1113.C.6. in accordance with the implementation procedures outlined under the Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards, October 30, 1995. Please see Appendix B-1, Water Quality Screen Spreadsheet.

Pollutant	Ce ¹	Ce x 2.13 ²	Water Quality Based Limit ³	Drinking Water Source	Permit Limit ?
Total Phenols	8	17.04	82.1 lbs/day	Yes ⁴	No
Total Zinc	170.4	363.0	97.0 lbs/day	Yes ⁴	No

- 1/ Metals concentration results were presented as total metals in lab analysis submitted by the permittee. All pollutants calculated in µg/l.
- 2/ For the reported effluent concentrations (Ce) it is estimated that 95% of the concentrations of chemicals taken over time will be 2.13 times the Ce or less.
- 3/ The water quality based limit is the maximum allowable instream concentration for that pollutant to be in compliance with water quality standards. Louisiana Water Quality Criteria for metals are hardness dependent, and expressed as dissolved metals. The water quality based limit is calculated with a conversion for metals limits expressed as total metals.
- 4/ See Additional Information on Page 8 of this Fact Sheet.

The following steps were used in evaluating the potential toxicity of the analyzed pollutants (see Appendix B-1):

- i. An evaluation of the applicability of the effluent data.

Results of the PPS were entered and compared to EPA's Minimum Quantification Levels (MQL's) to determine the potential presence of the respective toxic pollutant. Those pollutants with reported laboratory Method Detection Levels (MDL's) which exceed their respective EPA MQL's are determined to be reasonably present in the effluent and an evaluation of their potential toxicity is determined. Those pollutants with MDLs less than the MQL are determined to be not potentially present in the effluent and eliminated from further evaluation.

- ii. Calculation of permit limits based on applicable water quality standards.

Applicable water quality criteria are listed in the Appendix B-1 in Columns 12-14. These values were used to calculate the Waste Load Allocations (WLAs) for each of the toxic pollutants. The WLA is the maximum allowable concentration of a pollutant necessary to meet the respective water quality criteria. The WLAs are calculated as described in the State's Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards, dated October 30, 1995, as follows (Zinc is used as the example pollutant for the following calculations):

Complete Mix Balance Model for Waste Load Allocation

Qe	=	plant effluent, MGD = 4.9
Qr	=	critical flow of receiving stream, 1,330.0 cfs
Fs	=	MZ, ZID flow fraction, LAC 33:IX.1115.D.7 and 8 (MZ = 0.33, and ZID = 0.033)
Cr	=	numerical criteria value from LAC 33:IX.1113, Table 1
Cu	=	ambient instream concentration for pollutant. In the absence of accurate supporting data, assume Cu = 0
WLA	=	concentration for pollutant at end-of-pipe based on aquatic life and human health numerical criteria (site specific dilution type)
LTA	=	long term average, units same as WLA
WQBL	=	effluent water quality based limit.

$$\text{Dilution factor} = \frac{Q_e}{(Q_r F_s + Q_e)}$$

$$\begin{aligned} \text{Dilution factor (acute)} &= \frac{4.9}{(1,330.0)(0.6463)(0.033) + 4.9} \\ &= 0.147 \end{aligned}$$

$$\begin{aligned} \text{Dilution factor (chronic)} &= \frac{4.9}{(1,330.0)(0.6463)(0.33) + 4.9} \\ &= 0.017 \end{aligned}$$

$$\text{WLA} = (\text{Cr}/\text{Dilution factor}) - (\text{FsQrCu}/\text{Qe})$$

iii. Conversion of dissolved metals criteria for aquatic life to total metals.

Metals criteria for aquatic life protection are based on dissolved metals concentrations and hardness values averaged from data compilations contained in the Louisiana Water Quality Data Summary. A dissolved to total metal conversion will be implemented. Hardness and TSS are a function of the conversion. This involves determining a linear partition coefficient for the metal of concern and using this to determine the fraction of metal dissolved, so that the dissolved metal ambient criteria may be translated to a total effluent limit. The average hardness value used for the analysis is 166.0 mg/l CaCO₃ (USGS data). The 15th percentile TSS value is 34.0 mg/l. The formula for converting dissolved metals to total metals for streams and lakes are provided below.

K _p	=	Linear partition coefficient
K _{po}	=	found in Table A below
α	=	found in Table A below
TSS	=	total suspended solids concentration found in receiving stream or approximation thereof (nearest most representative site), lowest 15th percentile, units in mg/l
C _D /C _T	=	Fraction of metal dissolved
Cr	=	Dissolved criteria value for metal in water quality standards

$$K_p = K_{po} \times \text{TSS}^\alpha$$

$$K_p = (1.25 \times 10^6) \times 34.0^{(-0.7)}$$

$$\text{then, } \frac{C_D}{C_T} = \frac{1}{1 + (K_p)(TSS)(10^{-6})}$$

$$\frac{C_D}{C_T} = \frac{1}{1 + (105,894.8333)(34.0)(10^{-6})}$$

$$= 0.217$$

therefore,

$$\text{Total Metal} = \frac{C_r}{(C_D/C_T)}$$

TABLE A

LINEAR PARTITION COEFFICIENTS
FOR PRIORITY METALS IN STREAMS AND LAKES

(Delos et. al, 1984) (*1)

METAL	STREAMS		LAKES	
	K_{po}	α	K_{po}	α
Arsenic	0.48×10^6	-0.73	0.48×10^6	-0.73
Cadmium	4.00×10^6	-1.13	3.52×10^6	-0.92
Chromium III (*2)	3.36×10^6	-0.93	2.17×10^6	-0.27
Copper	1.04×10^6	-0.74	2.85×10^6	-0.9
Lead	2.80×10^6	-0.8	2.04×10^6	-0.53
Mercury	2.90×10^6	-1.14	1.97×10^6	-1.17
Nickel	0.49×10^6	-0.57	2.21×10^6	-0.76
Zinc	1.25×10^6	-0.7	3.34×10^6	-0.68

(*1) Delos, C. G., W. L. Richardson, J. V. DePinto, R. B. Ambrose, P. W. Rogers, K. Rygwelski, J. P. St. John, W. J. Shaughnessey, T. A. Faha, W. N. Christie. Technical Guidance for performing Waste Load Allocations, Book II: Streams and Rivers. Chapter 3: Toxic Substances, for the U. S. Environmental Protection Agency. (EPA-440/4-84-022).

(*2) Linear partition coefficients shall not apply to the Chromium VI numerical criterion. The approved analytical method for Chromium VI measures only the dissolved form. Therefore, permit limits for Chromium VI shall be expressed in the dissolved form. See 40 CFR 122.45(c)(3).

$$WLA_{a,c,h} = (Cr/Dilution\ factor) - (FsQrCu/Qe)$$

$$WLA_{acute} = (808.82/0.147) - [(0.033)(1,330.0)(0)/4.9] = 5,502.18$$

$$WLA_{chronic} = (766.27/0.0170) - [(0.33)(1,330.0)(0)/4.9] = 45,074.71$$

iv. Calculation of Long Term Averages (LTA's) and Permit Limits.

Comparison of the reported effluent data (converted to the 95th percentile) to the calculated effluent limitations. Long term averages are listed in the Appendix B-1 in Columns 15-17.

Long term averages are calculated for each WLA (based on aquatic and human health criteria). The LTA's are calculated as follows:

$$LTA_a = WLA_a \times 0.32$$

$$LTA_c = WLA_c \times 0.53$$

$$LTA_h = WLA_h$$

$$LTA_{acute} = 5,502.18 \times 0.32 = 1,760.70$$

$$LTA_{chronic} = 45,074.71 \times 0.53 = 23,889.60$$

A comparison of each LTA is made and the lowest (most restrictive) is selected to calculate the effluent limitations. The most limiting LTA is listed in Appendix B-1, Column 18.

Calculation of permit limits if aquatic life LTA is more limiting:

$$\text{Daily Average} = \text{Min}(LTA_a, LTA_c) \times 1.31$$

$$\text{Daily Maximum} = \text{Min}(LTA_a, LTA_c) \times 3.11$$

$$\text{Daily Average} = 1,760.70 \times 1.31 = 2,306.52 \mu\text{g/l}$$

$$\text{Daily Maximum} = 1,760.70 \times 3.11 = 5,475.78 \mu\text{g/l}$$

If human health LTA is more limiting:

$$\text{Daily Average} = LTA_h$$

$$\text{Daily Maximum} = LTA_h \times 2.38$$

The resulting allowable effluent concentration is converted to a mass value using the following formula:

$$\text{lbs/day} = (2.30652 \text{ mg/l}) \times 8.34 \times 4.9 \text{ MGD}$$

$$= 94.26 \text{ lbs/day}$$

Comparison of the reported effluent data (converted to 95th percentile) is made to the calculated effluent limitations. Water Quality Based limits are listed in Appendix B-1, Columns 19-22.

In accordance with the State of Louisiana's implementation procedures, the reported effluent concentration is compared to the calculated daily average concentration. If the effluent concentration is greater than the calculated daily average concentration, then a reasonable potential exists and an effluent limitation for the pollutant of concern is imposed in the permit. (Please refer to Appendix B-1 for the calculated daily average concentration listed in Column 19 and the effluent concentration listed in Column 3.)

The discharge is considered to pose a reasonable potential to cause a water quality excursion if the estimated 95th percentile of a pollutant in the effluent will result in an instream waste concentration, which is above the applicable State water quality criterion. The 95th percentile of possible effluent concentrations are estimated as follows:

$$C_{95} = C_{\text{mean}} * \exp (1.645 * \Phi - 0.5 * \Phi^2)$$

where: 1.645 = normal distribution factor at 95th percentile

$$\Phi^2 = \ln(\text{CV}^2 + 1)$$

if CV is assumed = 0.6,
 $\Phi^2 = .307$

The ratio of the estimated 95th percentile value to the mean (C_{95}/C_{mean}) is calculated :

$$C_{95}/C_{\text{mean}} = 2.13$$

Based upon review of the permittee's effluent data, there are no pollutant present or potentially present in the effluent discharge in such concentrations which would cause an exceedance of Louisiana's Water Quality Standards. A summary of the evaluation of the permittee's effluent analysis of the toxic pollutants is listed in Appendix B-1. As per LAC 33:IX.2709.F.1, all pollutants limited in permits shall have limitations, standards, or prohibitions expressed in terms of mass. Consequently, water quality-based limitations as seen in the permit are expressed in terms of mass.

APPENDIX B-1

Water Quality Screen

Wqsm04n wk4
Developer: Bruce Fielding
Software: Lotus 4.0
Revision date: 10/22/99

Water Quality Screen for

Input variables:
Receiving Water Characteristics:

Receiving Water Name=
Critical flow (Qr) cfs=
Harm. mean/avg tidal cfs=
Drinking Water=1 HHNPCR=2
Marine, 1=y, 0=n
Rec. Water Hardness=
Rec. Water TSS=
Fisch/Specific=1, Stream=0
Diffuser Ratio=

Red River

Dilution:
ZID F5 = 0.033333333
MZ F5 = 0.333333333
Critical Qr (MGD)=
Harm. Mean (MGD)=
ZID Dilution =
MZ Dilution =
HHnc Dilution=
HHc Dilution=
ZID Upstream =
MZ Upstream =
MZhhnc Upstream=

Toxicity Dilution Series:
Biomonitoring dilution:
Dilution Series Factor:

Dilution No. 1
Dilution No. 2
Dilution No. 3
Dilution No. 4
Dilution No. 5

0.168138546
0.75

Percent Effluent
22.418%
16.8139%
12.6104%
9.4578%
7.0933%

Partition Coefficients; Dissolved->Total

City of Natchitoches / WWTP
LA0095222

Permittee=

4.9

Facility flow (Qef),MGD=

Outfall Number =

001

Eff. data, 2=lbs/day

MQL, 2=lbs/day

Effluent Hardness=

Effluent TSS=

WQBL ind 0=y, 1=n

Acute/Chr. ratio 0=n, 1=y

Aquatic acute only 1=y, 0=n

METALS
Total Arsenic
Total Cadmium
Chromium III
Chromium VI
Total Copper
Total Lead
Total Mercury
Total Nickel
Total Zinc

FW
2.243771339
3.529110078
5.300736171
1
3.601464224
6.668312884
2.77007207
3.2321944
4.600424333

Aquatic Life, Dissolved

Metal Criteria, ug/L

METALS

Arsenic
Cadmium
Chromium III
Chromium VI
Copper
Lead
Mercury
Nickel
Zinc

ACUTE CHRONIC
360 190
59.67554024 1.688655772
2629.944438 313.4744942
16 11
30.94201268 19.73105055
155.6423045 6.065157159
2.4 0.012
2177.519511 242.0735653
179.7895955 162.8431151

Site Specific Multiplier Values:

CV =
N =
WLAa -> LTAA
WLAc -> LTAc
LTA ac->WQBL avg
LTA ac->WQBL max
LTA h-> WQBL max

Receiving Stream:
Default Hardness=
Default TSS=
25
10

Appendix B-1

Page Numbering/Labeling
Appendix
Page Numbers 1=y, 0=n
Input Page # 1=y, 0=n

Fischer/Site Specific inputs

Pipe=1, Canal=2, Specific=3

Pipe width, feet

ZID plume dist., feet

MZ plume dist., feet

HHnc plume dist., feet

HHc plume dist., feet

Fischer/site specific dilutions:

ZID Dilution =

Fspecific MZ Dilution =

Fspecific HHnc Dilution=

Fspecific HHc Dilution=

(*)1	(*)2	(*)3	(*)4	(*)5	(*)6	(*)7	(*)8	(*)9	(*)10	(*)11
Toxic Parameters	Cu Effluent /Tech	Effluent /Tech		MOL Effluent	95th % estimate	Numerical Criteria				HHNDW Carcinogen Indicator
Instream	Conc. ug/L	(Avg) ug/L	(Max) ug/L	1=No 95% 0=95 %	Non-Tech ug/L	FW ug/L	FW ug/L			"C"
NONCONVENTIONAL										
Total Phenols (AAP)				5	0	17.04	350	350	350	
3-Chlorophenol				10						
4-Chlorophenol				10		383		192		
2,3-Dichlorophenol				10						
2,5-Dichlorophenol				10						
2,6-Dichlorophenol				10						
3,4-Dichlorophenol				10						
2,4-Dichlorophenoxy-acetic acid (2,4-D)										
2-(2,4,5-Trichlorophenoxy) propionic acid (2,4,5-TP, Silven)										
METALS AND CYANIDE										
Total Arsenic				10		807.7576821	426.3165545			
Total Cadmium				1		210.6015505	5.959452104			
Chromium III				10		13940.64161	1661.64559			
Chromium VI				10		16	11			
Total Copper				10		111.4365517	71.06067267			
Total Lead				5		1037.871584	40.44436563			
Total Mercury				0.2		6.648172969	0.033240865			
Total Nickel				40		7038.16637	782.4288224			
Total Zinc				20		362.952	827.1084297	749.147429		
Total Cyanide				20		45.9	5.4	12844		

DIOXIN
2,3,7,8 TCDD: dioxin

1.00E-05

7.20E-07 C

VOLATILE COMPOUNDS

Benzene	10	2249	1125	12.5	C
Bromoforn	10	2930	1465	34.7	C
Bromodichloromethane	10			3.3	C
Carbon Tetrachloride	10	2730	1365	1.2	C
Chloroforn	10	2890	1445	70	C
Dibromochloromethane	10			5.08	C
1,2-Dichloroethane(EDC)	10	11800	5900	6.8	C
1,1-Dichloroethylene	10	1160	580	0.58	C
1,3-Dichloropropylene	10	606	303	162.79	
Ethylbenzene	10	3200	1600	8100	
Methyl Chloride	50	55000	27500		
Methylene Chloride	20	19300	9650	87	C
1,1,2,2-Tetrachloro-ethane	10	932	466	1.8	C

(*1) Toxic Parameters	(*12) WLa Acute	(*13) WLa Chronic	(*14) WLa HNDW	(*15) LTAA Acute	(*16) LTAA Chronic	(*17) LTAA HNDW	(*18) Limiting A.C.HH	(*19) WQBL Avg	(*20) WQBL Max	(*21) WQBL Avg	(*22) WQBL Max	(*23) WQBL Need
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	lbs/day	lbs/day	lbs/day
NONCONVENTIONAL												
Total Phenols (AAP)	4793.233333	20816.16667	8821.214286	1533.834667	11032.56833	8821.214286	1533.834667	2099.323413	4770.225813	82.11301061	194.9400481	no
3-Chlorophenol	---	---	---	---	---	---	---	---	---	---	---	no
4-Chlorophenol	2622.583381	11419.15429	---	839.2266819	6052.151771	---	839.2266819	1099.386953	2609.994981	44.92754723	106.6600549	no
2,3-Dichlorophenol	---	---	---	---	---	---	---	---	---	---	---	no
2,5-Dichlorophenol	---	---	---	---	---	---	---	---	---	---	---	no
2,6-Dichlorophenol	---	---	---	---	---	---	---	---	---	---	---	no
3,4-Dichlorophenol	---	---	---	---	---	---	---	---	---	---	---	no
2,4-Dichlorophenoxy- acetic acid (2,4-D)	---	---	---	---	---	---	---	---	---	---	---	no
2-(2,4,5-Trichlorophenoxy) propionic acid (2,4,5-TP, Silvex)	---	---	---	---	---	---	---	---	---	---	---	no
METALS AND CYANIDE												
Total Arsenic	5531.101496	25355.07557	---	1769.952479	13438.19005	---	1769.952479	2318.637747	5504.552209	94.75345018	224.9490306	no
Total Cadmium	1442.089102	354.436995	---	461.4685128	187.8516073	---	187.8516073	246.0856056	584.2184988	10.05653436	23.84767317	no
Chromium III	95458.21151	98825.97586	---	30546.62768	52377.76721	---	30546.62768	40016.08226	95000.01209	1635.297218	3882.270494	no
Chromium VI	109.559619	654.222381	---	35.0590781	346.7378619	---	35.0590781	45.9273923	109.0337329	1.876868814	4.455772528	no
Total Copper	763.0591345	4226.316588	---	244.178923	2239.947792	---	244.178923	319.8743892	759.3964506	13.07198679	31.03349535	no
Total Lead	7106.800962	2405.419016	---	2274.176308	1274.872079	---	1274.872079	1670.082423	3964.852164	68.24958829	162.0276485	no
Total Mercury	45.52320612	1.976992522	---	14.56742596	1.047806037	---	1.047806037	1.372625908	3.258676774	0.05609373	0.133169085	no
Total Nickel	48193.67664	46534.76792	---	15421.97653	24663.427	---	15421.97653	20202.78925	47962.347	825.6071855	1960.029272	no
Total Zinc	5663.605279	44555.36497	---	1812.353689	23614.34343	---	1812.353689	2374.183333	5636.419974	97.02337609	220.3379387	no
Total Cyanide	314.2991571	321.1637143	2265993.526	100.5757303	170.2167686	2265993.526	100.5757303	131.7542067	312.7905212	5.38426741	12.78249744	no
DIOXIN												
2,3,7,8 TCDD: dioxin	---	---	7.35E-04	---	---	7.35E-04	7.35E-04	7.35E-04	1.75E-03	3.00E-05	7.15E-05	no
VOLATILE COMPOUNDS												
Benzene	15399.97395	66909.10714	12765.38393	4927.991665	35461.82679	12765.38393	4927.991665	6455.669081	15326.05408	263.8173727	626.3145259	no
Bromolorm	20063.10524	87130.52619	35436.70579	6420.193676	46179.17888	35436.70579	6420.193676	8410.453716	19966.80233	343.7016016	815.9633441	no
Bromodichloromethane	---	---	3370.061357	---	---	3370.061357	3370.061357	3370.061357	8020.74603	137.7209274	327.7758073	no
Carbon Tetrachloride	18693.61	81183.05	1225.476857	5981.9552	43027.0165	1225.476857	1225.476857	1225.476857	2916.63492	50.08033724	119.1912026	no
Chloroform	19789.20619	85941.03095	71486.15	6332.545981	45548.7464	71486.15	6332.545981	8295.635235	19694.218	339.0094295	804.8239128	no
Dibromochloromethane	---	---	5187.852029	---	---	5187.852029	5187.852029	5187.852029	12347.08783	212.006761	504.5760912	no
1,2-Dichloroethane(EDC)	80800.21905	350901.0952	6944.368857	25856.0701	185977.5805	6944.368857	6944.368857	6944.368857	16327.59788	283.7885777	675.416815	no
1,1-Dichloroethylene	7943.072381	34495.3619	592.3138143	2541.783162	18282.54181	592.3138143	592.3138143	592.3138143	1409.706878	24.20549633	57.60908128	no
1,3-Dichloropropylene	4149.570571	18020.85286	28720.10947	1327.862583	9551.052014	28720.10947	1327.862583	1739.499984	4129.652633	71.08640633	168.7623845	no
Ethylbenzene	21911.92381	95159.61905	1429036.714	7011.815619	50434.5981	1429036.714	7011.815619	9185.478461	21806.74658	375.3737628	891.1545055	no
Methyl Chloride	37661.11905	163555.952	---	120515.581	866844.6548	---	120515.581	157875.411	374803.4568	6451.736548	15316.71806	no
Methylene Chloride	132156.2905	573931.4524	88847.07214	42290.01295	304183.6698	88847.07214	42290.01295	55399.91697	131521.9403	2263.973007	5374.773612	no
1,1,2,2-Tetrachloro- ethane	6381.84781	27715.23905	1838.215286	2042.191299	14689.0767	1838.215286	1838.215286	1838.215286	4374.95238	75.12050587	178.786804	no

(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)	(*8)	(*9)	(*10)	(*11)
Toxic Parameters	Cu Effluent /Tech Conc. ug/L	(Avg)	Effluent /Tech (Max) ug/L	MQL Effluent I=No 95% 0=95 % ug/L	95th % Non-Tech estimate ug/L	Numerical Criteria Acute FW ug/L	Chronic FW ug/L	HHNDW ug/L	Carcinogen Indicator -C-	
VOLATILE COMPOUNDS (cont'd)										
Tetrachloroethylene				10		1290	645	2.5	C	
Toluene				10		1270	635	46200		
1,1,1-Trichloroethane				10		5280	2640			
1,1,2-Trichloroethane				10		1800	900	6.9	C	
Trichloroethylene				10		3900	1950	21	C	
Vinyl Chloride				10				35.8	C	
ACID COMPOUNDS										
2-Chlorophenol				10		258	129	126.4		
2,4-Dichlorophenol				10		202	101	232.6		
BASE NEUTRAL COMPOUNDS										
Benzidine				50		250	125	0.00017	C	
Hexachlorobenzene				10		5.1	1.02	0.00025	C	
Hexachlorobutadiene				10				0.11	C	
PESTICIDES										
Aldrin				0.05		3		0.0004	C	
Hexachlorocyclohexane (gamma BHC, Lindane)				0.05		5.3	0.21	0.2	C	
Chlordane				0.2		2.4	0.0043	0.00019	C	
4,4'-DDT				0.1		1.1	0.001	0.00019	C	
4,4'-DDE				0.1		52.5	10.5	0.00019	C	
4,4'-DDD				0.1		0.03	0.006	0.00027	C	
Dieldrin				0.1		2.5	0.0019	0.00005	C	
Endosulfan				0.1		0.22	0.056	0.64		
Endrin				0.1		0.18	0.0023	0.26		
Heptachlor				0.05		0.52	0.0038	0.00007	C	
Toxaphene				5		0.73	0.0002	0.00024	C	

Other Parameters:

Fecal Colif. (col/100ml)

Chlorine

Ammonia

Chlorides

Sulfates

19

11

Other Parameters:

APPENDIX B-2

**Documentation and Explanation of
Water Quality Screen and
Associated Lotus Spreadsheet**

APPENDIX B-2
LA0095222/AI 38060/PER20060001

**Documentation and Explanation of Water Quality Screen
and Associated Lotus Spreadsheet**

Each reference column is marked by a set of parentheses enclosing a number and asterisk, for example (*1) or (*19). These columns represent inputs, existing data sets, calculation points, and results for determining Water Quality Based Limits for an effluent of concern. The following represents a summary of information used in calculating the water quality screen:

Receiving Water Characteristics:

Receiving Water: Red River
Critical Flow, Qrc (cfs): 1330.0 cfs
Harmonic Mean Flow, Qrh (cfs): 7735 cfs
Segment(s) No.: 100101
Receiving Stream Hardness: 166.0 mg/l
Receiving Stream TSS: 34.0 mg/l
MZ Stream Factor, Fs: 0.33 cfs
Plume distance, Pf: N/A

Effluent Characteristics:

Company: City of Natchitoches / WWTP
Facility flow, Qe (MGD): 4.9 MGD
Effluent Hardness: N/A
Effluent TSS: N/A
Pipe/canal width, Pw: N/A
Permit Number: LA0095222

Variable Definition:

Qrc, critical flow of receiving stream: 1330.0 cfs
Qrh, harmonic mean flow of the receiving stream, 7735 cfs
Pf = Allowable plume distance in feet, specified in LAC 33.IX.1115.D
Pw = Pipe width or canal width in feet
Qe, total facility flow, 4.9 MGD
Fs, stream factor from LAC.IX.33.11 (1 for harmonic mean flow)
Cu, ambient concentration, ug/L
Cr, numerical criteria from LAC.IX.1113, Table 1
WLA, wasteload allocation
LTA, long term average calculations
WQBL, effluent water quality based limit
ZID, Zone of Initial Dilution in % effluent
MZ, Mixing Zone in % effluent

Appendix B-2
Page 2

Formulas used in aquatic life water quality screen (dilution type WLA):

Streams: Dilution Factor =
$$\frac{Q_e}{(Q_{rc} \times 0.6463 \times F_s + Q_e)}$$

$$WLA_{a,c,h} = \frac{Cr}{\text{Dilution Factor}} - \frac{(F_s \times Q_{rc} \times 0.6463 \times Cu)}{Q_e}$$

Static water bodies (in the absence of a site specific dilution):

Discharge from a pipe:

Discharge from a canal:

Critical

$$\text{Dilution} = \frac{(2.8) P_w \pi^{1/2}}{P_f}$$

Critical

$$\text{Dilution} = \frac{(2.38)(P_w^{1/2})}{(P_f)^{1/2}}$$

$$WLA = \frac{(Cr-Cu) P_f}{(2.8) P_w \pi^{1/2}}$$

$$WLA = \frac{(Cr-Cu) P_f^{1/2}}{2.38 P_w^{1/2}}$$

Formulas used in human health water quality screen, human health non-carcinogens (dilution

type WLA):

Streams:

$$\text{Dilution Factor} = \frac{Q_e}{(Q_{rc} \times 0.6463 + Q_e)}$$

$$WLA_{a,c,h} = \frac{Cr}{\text{Dilution Factor}} - \frac{(Q_{rc} \times 0.6463 \times Cu)}{Q_e}$$

Formulas used in human health water quality screen, human health carcinogens (dilution type WLA):

$$\text{Dilution Factor} = \frac{Q_e}{(Q_{rh} \times 0.6463 + Q_e)}$$

$$WLA_{a,c,h} = \frac{Cr}{\text{Dilution Factor}} - \frac{(Q_{rh} \times 0.6463 \times Cu)}{Q_e}$$

Static water bodies in the absence of a site specific dilution (human health carcinogens and human health non-carcinogens):

Discharge from a pipe:

Discharge from a canal:

Critical

$$\text{Dilution} = \frac{(2.8) P_w \pi^{1/2}}{P_f}$$

Critical

$$\text{Dilution} = \frac{(2.38)(P_w^{1/2})}{(P_f)^{1/2}}$$

$$WLA = \frac{(Cr-Cu) P_f^*}{(2.8) P_w \pi^{1/2}}$$

$$WLA = \frac{(Cr-Cu) P_f^{1/2*}}{2.38 P_w^{1/2}}$$

Appendix B-2

Page 3

* Pf is set equal to the mixing zone distance specified in LAC 33:IX.1115 for the static water body type, i.e., lake, estuary, Gulf of Mexico, etc.

If a site specific dilution is used, WLA are calculated by subtracting Cu from Cr and dividing by the site specific dilution for human health and aquatic life criteria.

$$WLA = \frac{(Cr - Cu)}{\text{site specific dilution}}$$

Longterm Average Calculations:

$$LTAa = WLAa \times 0.32$$

$$LTAc = WLAc \times 0.53$$

$$LTAh = WLAh$$

WQBL Calculations:

Select most limiting LTA to calculate daily max and daily avg WQBL

If aquatic life LTA is more limiting:

$$\text{Daily Maximum} = \text{Min}(LTAa, LTAc) \times 3.11$$

$$\text{Monthly Average} = \text{Min}(LTAa, LTAc) \times 1.31$$

If human health LTA is more limiting:

$$\text{Daily Maximum} = LTAh \times 2.38$$

$$\text{Monthly Average} = LTAh$$

Mass Balance Formulas:

$$\text{mass (lbs/day): } (ug/L) \times 1/1000 \times (\text{flow, MGD}) \times 8.34 = \text{lbs/day}$$

$$\text{concentration(ug/L): } \frac{\text{lbs/day}}{(\text{flow, MGD}) \times 8.34 \times 1/1000} = \text{ug/L}$$

The following is an explanation of the references in the spreadsheet.

- (*1) Parameter being screened.
- (*2) Instream concentration for the parameter being screened in ug/L. In the absence of accurate supporting data, the instream concentration is assumed to be zero (0).
- (*3) Monthly average effluent value in concentration units of ug/L or mass units of lbs/day. Units determined on a case-by-case basis as appropriate to the particular situation.
- (*4) Daily maximum value in concentration units of ug/L or mass units of lbs/day. Units determined on a case-by-case basis as appropriate to the particular situation.
- (*5) Minimum analytical Quantification Levels (MQL's). Established in a letter dated January 27, 1994 from Wren Stenger of EPA Region 6 to Kilren Vidrine of LDEQ and from the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". The applicant must test for the parameter at a level at least as sensitive as the specified MQL. If

this is not done, the MQL becomes the application value for screening purposes if the pollutant is suspected to be present on-site and/or in the waste stream. Units are in ug/l or lbs/day depending on the units of the effluent data.

- (*6) States whether effluent data is based on 95th percentile estimation. A "1" indicates that a 95th percentile approximation is being used, a "0" indicates that no 95th percentile approximation is being used.
- (*7) 95th percentile approximation multiplier (2.13). The constant, 2.13, was established in memorandum of understanding dated October 8, 1991 from Jack Ferguson of Region 6 to Jesse Chang of LDEQ and included in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". This value is screened against effluent Water Quality Based Limits established in columns (*18) - (*21). Units are in ug/l or lbs/day depending on the units of the measured effluent data.
- (*8) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, freshwater (FW) or marine water (MW) (whichever is applicable) aquatic life protection, acute criteria. Units are specified. Some metals are hardness dependent. The hardness of the receiving stream shall generally be used, however a flow weighted hardness may be determined in site-specific situations using the following formula: $(\text{Effluent Hardness} \times \text{ZID Dilution} + \text{Receiving Stream Hardness} \times (1 - \text{ZID Dilution}))$. Dissolved metals are converted to Total metals using partition coefficients in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Similar to hardness, the TSS of the receiving stream shall generally be used, however, a flow weighted TSS may be determined in site-specific situations using the following formula: $(\text{Effluent TSS} \times \text{ZID Dilution} + \text{Receiving Stream TSS} \times (1 - \text{ZID Dilution}))$.

Hardness Dependent Criteria:

<u>Metal</u>	<u>Formula</u>
Cadmium	$e^{(1.1280[\ln(\text{hardness})] - 1.6774)}$
Chromium III	$e^{(0.8190[\ln(\text{hardness})] + 3.6880)}$
Copper	$e^{(0.9422[\ln(\text{hardness})] - 1.3884)}$
Lead	$e^{(1.2730[\ln(\text{hardness})] - 1.4600)}$
Nickel	$e^{(0.8460[\ln(\text{hardness})] + 3.3612)}$
Zinc	$e^{(0.8473[\ln(\text{hardness})] + 0.8604)}$

Dissolved to Total Metal Multipliers for Freshwater Streams (TSS dependent):

<u>Metal</u>	<u>Multiplier</u>
Arsenic	$1 + 0.48 \times \text{TSS}^{-0.73} \times \text{TSS}$
Cadmium	$1 + 4.00 \times \text{TSS}^{-1.13} \times \text{TSS}$
Chromium III	$1 + 3.36 \times \text{TSS}^{-0.93} \times \text{TSS}$
Copper	$1 + 1.04 \times \text{TSS}^{-0.74} \times \text{TSS}$
Lead	$1 + 2.80 \times \text{TSS}^{-0.80} \times \text{TSS}$
Mercury	$1 + 2.90 \times \text{TSS}^{-1.14} \times \text{TSS}$
Nickel	$1 + 0.49 \times \text{TSS}^{-0.57} \times \text{TSS}$
Zinc	$1 + 1.25 \times \text{TSS}^{-0.70} \times \text{TSS}$

Dissolved to Total Metal Multipliers for Marine Environments (TSS dependent):

<u>Metal</u>	<u>Multiplier</u>
Copper	$1 + (10^{4.86} \times \text{TSS}^{-0.72} \times \text{TSS}) \times 10^{-6}$
Lead	$1 + (10^{6.06} \times \text{TSS}^{-0.85} \times \text{TSS}) \times 10^{-6}$
Zinc	$1 + (10^{5.36} \times \text{TSS}^{-0.52} \times \text{TSS}) \times 10^{-6}$

If a metal does not have multiplier listed above, then the dissolved to total metal multiplier shall be 1.

- (*9) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, freshwater (FW) or marine water (MW) (whichever is applicable) aquatic life protection, chronic criteria. Units are specified. Some metals are hardness dependent. The hardness of the receiving stream shall generally be used, however a flow weighted hardness may be determined in site-specific situations using the following formula: (Effluent Hardness X MZ Dilution + Receiving Stream Hardness X (1 - MZ Dilution)). Dissolved metals are converted to Total metals using partition coefficients in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Similar to hardness, the TSS of the receiving stream shall generally be used,

however, a flow weighted TSS may be determined in site-specific situations using the following formula: (Effluent TSS X MZ Dilution + Receiving Stream TSS X (1-MZ Dilution)).

Hardness dependent criteria:

<u>Metal</u>	<u>Formula</u>
Cadmium	$e^{(0.7852[\ln(\text{hardness})] - 3.4900)}$
Chromium III	$e^{(0.8473[\ln(\text{hardness})] + 0.7614)}$
Copper	$e^{(0.8545[\ln(\text{hardness})] - 1.3860)}$
Lead	$e^{(1.2730[\ln(\text{hardness})] - 4.7050)}$
Nickel	$e^{(0.8460[\ln(\text{hardness})] + 1.1645)}$
Zinc	$e^{(0.8473[\ln(\text{hardness})] + 0.7614)}$

Dissolved to total metal multiplier formulas are the same as (*8), acute numerical criteria for aquatic life protection.

(*10) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, human health protection, drinking water supply (HHDW), non-drinking water supply criteria (HHNDW), or human health non-primary contact recreation (HHNPCR) (whichever is applicable). A DEQ and EPA approved Use Attainability Analysis is required before HHNPCR is used, e.g., Monte Sano Bayou. Units are specified.

(*11) C if screened and carcinogenic. If a parameter is being screened and is carcinogenic a "C" will appear in this column.

(*12) Wasteload Allocation for acute aquatic criteria (WLAa). Dilution type WLAa is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the acute aquatic numerical criteria for that parameter. Units are in ug/L. Dilution WLAa formulas for streams:

$$\text{WLAa} = (\text{Cr}/\text{Dilution Factor}) - \frac{(\text{Fs} \times \text{Qrc} \times 0.6463 \times \text{Cu})}{\text{Qe}}$$

Dilution WLAa formulas for static water bodies:

$$\text{WLAa} = (\text{Cr}-\text{Cu})/\text{Dilution Factor}$$

Cr represents aquatic acute numerical criteria from column (*8).

If Cu data is unavailable or inadequate, assume Cu=0

- (*13) Wasteload Allocation for chronic aquatic criteria (WLA_c). Dilution type WLA_c is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the chronic aquatic numerical criteria for that parameter. Units are in ug/L. Dilution WLA_c formula:

$$WLA_c = (Cr/Dilution\ Factor) - \frac{(Fs \times Q_{rc} \times 0.6463 \times Cu)}{Q_e}$$

Dilution WLA_c formulas for static water bodies:

$$WLA_c = (Cr - Cu)/Dilution\ Factor$$

Cr represents aquatic chronic numerical criteria from column (*9).

If Cu data is unavailable or inadequate, assume Cu=0

- (*14) Wasteload Allocation for human health criteria (WLA_h). Dilution type WLA_h is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the human health numerical criteria for that parameter. Units are in ug/L. Dilution WLA_h formula:

$$WLA_h = (Cr/Dilution\ Factor) - \frac{(Fs \times Q_{rc}, Q_{rh} \times 0.6463 \times Cu)}{Q_e}$$

Dilution WLA_h formulas for static water bodies:

$$WLA_h = (Cr - Cu)/Dilution\ Factor$$

Cr represents human health numerical criteria from column (*10).

If Cu data is unavailable or inadequate, assume Cu=0

- (*15) Long Term Average for aquatic numerical criteria (LTA_a). WLA_a numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 0.32. WLA_a X 0.32 = LTA_a
- (*16) Long Term Average for chronic numerical criteria (LTA_c). WLA_c numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 0.53. WLA_c X 0.53 = LTA_c
- (*17) Long Term Average for human health numerical criteria (LTA_h). WLA_h numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 1. WLA_h X 1 = LTA_h
- (*18) Limiting Acute, Chronic or Human Health LTA's. The most limiting LTA is placed in this column. Units are consistent with the WLA calculation.
- (*19) End of pipe Water Quality Based Limit (WQBL) maximum 30-day monthly average in terms of concentration, ug/L. If aquatic life criteria was the most limiting LTA then the limiting LTA is multiplied by 1.31 to determine the average WQBL (LTA_{limiting aquatic} X 1.31 = WQBL_{daily average}). If human health criteria was the most limiting criteria then LTA_h = WQBL_{daily average}.

- (*20) End of pipe Water Quality Based Limit (WQBL) 30-day daily maximum in terms of concentration, ug/L. If aquatic life criteria was the most limiting LTA then the limiting LTA is multiplied by 3.11 to determine the daily maximum WQBL ($LTA_{\text{limiting aquatic}} \times 3.11 = WQBL_{\text{daily max}}$). If human health criteria was the most limiting criteria then LTAh is multiplied by 2.38 to determine the daily maximum WQBL ($LTA_{\text{limiting aquatic}} \times 2.38 = WQBL_{\text{daily max}}$).
- (*21) End of pipe Water Quality Based Limit (WQBL) maximum 30-day monthly average in terms of mass, lbs/day. The mass limit is determined by using the mass balance equations above. Daily average WQBL, $ug/l/1000 \times \text{facility flow, MGD} \times 8.34 = \text{daily average WQBL, lbs/day}$.
- (*22) End of pipe Water Quality Based Limit (WQBL) 30 day daily maximum in terms of mass, lbs/day. Mass limit is determined by using the mass balance equations above. Daily maximum WQBL, $ug/l/1000 \times \text{facility flow, MGD} \times 8.34 = \text{daily maximum WQBL, lbs/day}$.

WQBL CALCULATIONS

WQBL CALCULATIONS FOR CITY OF NATCHITOCHEs / WASTEWATER TREATMENT PLANT LA0095222, AI 38060

DESIGN CAPACITY (Q_c): 4.9 MGD

CRITICAL LOW FLOW (7Q10): 1,330.0 cfs.

HARDNESS VALUE: 166.0 mg/L

FIFTEENTH PERCENTILE VALUE FOR TSS: 34.0 mg/L

PRIORITY POLLUTANT: ZINC

- $$\begin{aligned} \text{Zn (Acute)} &= e^{(0.8473 [\ln(\text{hardness})] + 0.8604)} \times CF \\ &= e^{(0.8473 [\ln 166.0] + 0.8604)} \times 0.978 \\ &= e^{(0.8473)(5.111987788) + 0.8604} \times 0.978 \\ &= e^{5.191787253} \times 0.978 \\ &= 179.7895954 \times 0.978 \\ &= 175.8342243 = 175.83 \mu\text{g/L} \end{aligned}$$

- $$\begin{aligned} \text{Zn (Chronic)} &= e^{(0.8473 [\ln(\text{hardness})] + 0.7614)} \times CF \\ &= e^{(0.8545 [\ln 166.0] + 0.7614)} \times 0.986 \\ &= e^{(0.8545)(5.111987788) + 0.7614} \times 0.986 \\ &= e^{5.129593565} \times 0.986 \\ &= 168.9484375 \times 0.986 \\ &= 166.5831594 = 166.58 \mu\text{g/L} \end{aligned}$$

DISSOLVED TO TOTAL METAL CONVERSION

$$\frac{C_D}{C_T} = \frac{1}{1 + (K_p)(\text{TSS})(10^{-6})}$$

$$K_p = K_{po} \times \text{TSS}^a$$

$$K_p = 1.25 \times 10^6 \times 34.0^{(-0.7)}$$

$$= 105,894.8333$$

$$\frac{C_D}{C_T} = \frac{1}{1 + (105,894.8333)(34.0)(10^{-6})}$$

$$= \frac{1}{4.600424332}$$

$$= 0.217371252 = 0.217$$

$$\frac{\text{TOTAL}}{\text{DISSOLVED}} = \frac{C_T}{C_D} = 4.60$$

	DISSOLVED	X	C_T / C_D	=	TOTAL
Acute Criteria	175.83 µg/L	X	4.60	=	808.82 µg/L
Chronic Criteria	166.58 µg/L	X	4.60	=	766.27 µg/L
Human Health _{nc}	5,000 µg/L	X	4.60	=	23,000 µg/L

DILUTION

	DISSOLVED	TOTAL
ACUTE	175.83 µg/L	808.82 µg/L
CHRONIC	166.58 µg/L	766.27 µg/L
HUMAN HEALTH	5,000 µg/L	23,000 µg/L

DILUTION CALCULATIONS

$$\text{DILUTION FACTOR} = \frac{Q_e}{Q_r \times F_s + Q_e}$$

- $$\text{ZID (ACUTE)} = \frac{4.9 \text{ MGD}}{(1,330.0 \text{ cfs})(0.6463 \text{ MGD/cfs})(0.033 \text{ cfs}) + 4.9 \text{ MGD}} = 0.147$$
- $$\text{MZ (CHRONIC)} = \frac{4.9 \text{ MGD}}{(1,330.0 \text{ cfs})(0.6463 \text{ MGD/cfs})(0.33 \text{ cfs}) + 4.9 \text{ MGD}} = 0.0170$$
- $$\text{HH (HUMAN HEALTH)} = \frac{4.9 \text{ MGD}}{(1,330.0 \text{ cfs})(0.6463 \text{ MGD/cfs})(1 \text{ cfs}) + 4.9 \text{ MGD}} = 0.00567$$

CONCLUDE THAT:

- 14.7% of effluent at edge of ZID
- 1.70% of effluent at edge of MZ
- 0.567% of effluent at edge of HH_{nc}

WASTELOAD ALLOCATION CALCULATIONS

$$WLA = \frac{C_i}{\text{Dilution}} = \frac{F_s \times C_i \times C_u}{Q_c} \quad C_u = 0$$

- $WLA_{ZID} \text{ (ACUTE)} = \frac{808.82 \text{ } \mu\text{g/L}}{0.147} = 5,502.18 \text{ } \mu\text{g/L}$
- $WLA_{MZ} \text{ (CHRONIC)} = \frac{766.27 \text{ } \mu\text{g/L}}{0.0170} = 45,074.71 \text{ } \mu\text{g/L}$
- $WLA_{HH} \text{ (HUMAN HEALTH)} = \frac{23,000 \text{ } \mu\text{g/L}}{0.00567} = 4,056,437.39 \text{ } \mu\text{g/L}$

LTA CALCULATIONS

- $LTA_{ZID} \text{ (ACUTE)} = WLA_{ZID} \times 0.32$
 $= 5,502.18 \text{ } \mu\text{g/L} \times 0.32 = 1,760.70 \text{ } \mu\text{g/L}$
- $LTA_{MZ} \text{ (CHRONIC)} = WLA_{MZ} \times 0.53$
 $= 45,074.71 \text{ } \mu\text{g/L} \times 0.53 = 23,889.60 \text{ } \mu\text{g/L}$
- $LTA_{HH} \text{ (HUMAN HEALTH)} = WLA_{HH} \times 1$
 $= 4,056,437.39 \text{ } \mu\text{g/L} \times 1 = 4,056,437.39 \text{ } \mu\text{g/L}$

WQBL CALCULATIONS

- **LIMITING LTA** = 1,760.70 $\mu\text{g/l}$
- **MONTHLY AVERAGE** = LIMITING LTA \times 1.31
 $= 1,760.70 \text{ } \mu\text{g/L} \times 1.31$
 $= 2,306.52 \text{ } \mu\text{g/L}$
 $= 2.30652 \text{ mg/L} \times 4.9 \text{ MGD} \times 8.34 \text{ lbs/day} = 94.26 \text{ lbs/day}$
- **DAILY MAXIMUM** = LIMITING LTA \times 3.11
 $= 1,760.70 \text{ } \mu\text{g/L} \times 3.11$
 $= 5,475.78 \text{ } \mu\text{g/L}$
 $= 5.47578 \text{ mg/L} \times 4.9 \text{ MGD} \times 8.34 \text{ lbs/day} = 223.77 \text{ lbs/day}$

STREAM FLOW CHARACTERISTICS REPORT

MEMORANDUM

TO: Jeremy "Todd" Franklin
FROM: George Chike
DATE: March 8, 2006
RE: Stream Flow and Water Quality Characteristics for Red River, receiving
stream for the City of Natchitoches Wastewater Treatment Plant with Permit
No. LA 0095222/AI 38060

Determinations of water quality characteristics for the outfall was taken from a DEQ monitoring station #115 on Red River at Grand Ecore at the Bridge on Hwy 6, about 4 miles north of Natchitoches, Louisiana. The following results were obtained;

Average hardness = 166.0 mg/l
15th percentile TSS = 34.0 mg/l

Based on the available data, the flow figures were determined as follows:

7Q10 = 1330.0 CFS
Harmonic Mean = 7735 CFS

If you have additional questions or comments, please contact me at 2-3467.

GC:gc

BIOMONITORING REQUIREMENTS

BIOMONITORING FREQUENCY RECOMMENDATION AND RATIONALE FOR ADDITIONAL REQUIREMENTS

Permit Number: **LA0095222**
 Facility Name: **City of Natchitoches WWTP**
 Previous Critical Dilution: **16.81%** Proposed Critical Dilution: **17% (10:1 ACR)**
 Date of Review: **03/13/06** Name of Reviewer: **Kim Gunderson**

Recommended Frequency by Species:

Pimephales promelas (Fathead minnow): **Once/Quarter¹**
Daphnia pulex (water flea): **Once/Quarter¹**

Recommended Dilution Series: **7%, 9%, 13%, 17%, and 22%**

Number of Tests Performed during previous 5 years by Species:

Pimephales promelas (Fathead minnow): **20 (2 retests)**
Daphnia pulex (water flea): **18**
Daphnia magna (water flea): **N/A – Testing of species was not required**
Ceriodaphnia dubia (water flea): **N/A – Testing of species was not required**

Number of Failed Tests during previous 5 years by Species:

Pimephales promelas (Fathead minnow): **1**
Daphnia pulex (water flea): **No failures on file during the past 5 years**
Daphnia magna (water flea): **N/A – Testing of species was not required**
Ceriodaphnia dubia (water flea): **N/A – Testing of species was not required**

Failed Test Dates during previous 5 years by Species:

Pimephales promelas (Fathead minnow): **Test period: 03/01/02-05/31/02**
Daphnia pulex (water flea): **No failures on file during the past 5 years**
Daphnia magna (water flea): **N/A – Testing of species was not required**
Ceriodaphnia dubia (water flea): **N/A – Testing of species was not required**

Previous TRE Activities: **N/A – No previous TRE Activities**

¹ If there are no lethal effects demonstrated after the first year of quarterly testing, the permittee may certify fulfillment of the WET testing requirements in writing to the permitting authority. If granted, the monitoring frequency for the test species may be reduced to not less than once per year for the less sensitive species (usually *Pimephales promelas*) and not less than twice per year for the more sensitive species (usually *Daphnia pulex*). Upon expiration of the permit, the monitoring frequency for both species shall revert to once per quarter until the permit is re-issued.

Additional Requirements (including WET Limits) Rationale / Comments Concerning Permitting:

The City of Natchitoches owns and operates an existing publicly owned treatment works facility serving the City of Natchitoches, Natchitoches Parish, Louisiana. NPDES Permit LA0095222, effective June 1, 2001, contained freshwater acute biomonitoring as an effluent characteristic of Outfall 001 for *Daphnia pulex* and *Pimephales promelas*. The effluent series consisted of 7.09%, 9.46%, 12.61%, 16.81%, and 22.42% concentrations, with the 16.81% effluent concentration being defined as the critical dilution. The testing was to be performed quarterly for *Daphnia pulex* and *Pimephales promelas*. Data on file indicate that the permittee experienced one lethal failure to the *Pimephales promelas* during the test period 03/01/02-05/31/02. Both subsequent retests passed at the NOEC value of 22.42%.

To adequately assess the facility's effluent potential for receiving stream and/or aquatic species toxicity, it is recommended that freshwater acute biomonitoring continue to be an effluent characteristic of Outfall 001 (design capacity of 4.9 MGD for treated sanitary wastewater) in LA0095222. The effluent dilution series shall be 7%, 9%, 13%, 17%, and 22% concentrations, with the 17% effluent concentration being defined as the critical dilution (the 10:1 Acute-to-Chronic ratio has been implemented because the critical dilution was less than 5%). In accordance with the Environmental Protection Agency (Region 6) WET testing frequency acceleration(s), the biomonitoring frequency shall be once per quarter for *Daphnia pulex* and *Pimephales promelas*. If there are no significant lethal effects demonstrated at or below the critical dilution during the first four quarters of testing, the permittee may certify fulfillment of the WET testing requirements to the permitting authority and WET testing may be reduced to not less than once per six months for the more sensitive species (*Daphnia pulex*) and not less than once per year for the less sensitive species (*Pimephales promelas*) for the remainder of the term of the permit. Upon expiration of the permit, the monitoring frequency for both test species shall revert to once per quarter until the permit is re-issued.

This recommendation is in accordance with the LDEQ/OES Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards, EPA Region 6 Post-Third Round Whole Effluent Toxicity Testing Frequencies (Revised June 30, 2000), and the Best Professional Judgement (BPJ) of the reviewer.

PRETREATMENT REQUIREMENTS

PRETREATMENT EVALUATION AND RECOMMENDATION

FACILITY NAME: *City of Natchitoches WWTP*

CITY: *Natchitoches*

PARISH: *Natchitoches*

PERMIT #: *LA0095222*

DESIGN FLOW: *4.9 MGD*

ACTUAL FLOW: *2.67 MGD*

OTHER POTWs IN SYSTEM: *none*

SIGNIFICANT INDUSTRIES LISTED IN MANUFACTURERS GUIDE:

Industry Name	Type of Industry	Direct or Indirect Discharger
Acme Cement Products Co. Inc.	Ready-mixed concrete	N/A ¹
Alliance Compressors	Manufactures heating and air conditioning scroll compressors	Indirect ²
Arterrete Inc.	Manufactures architectural patterned concrete products	Indirect ³
Build Supplies Inc.	Manufactures ready-mixed concrete	Indirect ⁴
Coushatta Citizen – Natchitoches Times Inc.	Publishes newspaper five days a week providing offset and letterpress printing services	Indirect ⁵
Natchitoches WD Preserving Co.	Treated fence posts and dimensional lumber	N/A ⁶
Pilgrims Pride	Provides poultry processing services	Both ⁷

¹ This facility has closed.

² This facility appears likely to be regulated by 40 CFR Part 433, Metal Finishing. Therefore, Alliance Compressors is being included in current planning for regulation of Categorical Industrial Users (CIUs) in non-pretreatment cities by LDEQ.

³ This facility designs concrete driveways for customers. The discharge from their office is sanitary wastewater only.

⁴ The discharge is sanitary wastewater only.

⁵ This facility prints the newspaper onsite; however, no waste inks or ink solutions are discharged to the POTW. The discharge is sanitary wastewater only.

⁶ This facility is not connected to the POTW.

⁷ Process wastewater discharges from the poultry processing plant are regulated via LPDES permit LA0054178. Sanitary wastewater and wastewater from the hatchery are discharged to the POTW.

Melissa Reboul – 3/15/2006

Industry Name	Type of Industry	Direct or Indirect Discharger
Signs and Banners LLC	Manufactures magnetic, metal, painted, wooden, vinyl lettered signs and banners	Indirect ⁸
Trus Joist A Weyerhaeuser Bus	Manufactures engineered wood joists and veneer lumber specializing in hardwood and softwood	Direct ⁹

STANDARD LANGUAGE RECOMMENDATION AND JUSTIFICATION:

After reviewing the 2005 Directory of Louisiana Manufacturers and via discussions with City of Natchitoches wastewater plant personnel, it was ascertained that, with the exception of Alliance Compressors, there were no pretreatment categorical standards for the indirect discharges listed above or the discharge is of sanitary wastewater only. The wastewater discharge from Alliance Compressors appears likely to be regulated by 40 CFR Part 433, Metal Finishing. Therefore, Alliance Compressors is being included in current planning for regulation of Categorical Industrial Users (CIUs) in non-pretreatment cities by LDEQ.

It is recommended that LDEQ Option 1 Pretreatment Language be included in LPDES Permit LA0095222. This language is established for municipalities that do not have either an approved or required Pretreatment program. This recommendation is in accordance with 40 CFR Part 403 regulations, the General Pretreatment Regulations for Existing and New Sources of Pollution contained in LAC Title 33, Part IX, Chapter 61 and the Best Professional Judgement (BPJ) of the reviewer.

⁸ This facility primarily performs maintenance on signs which are shipped in. The discharge is sanitary wastewater only.

⁹ The process wastewater discharges from this facility are authorized under LPDES Permit LA0038482.